International Journal of Agricultural Science and Research (IJASR)
ISSN(P): 2250-0057; ISSN(E): 2321-0087
Vol. 5, Issue 3, Jun 2015, 81-84
TJPRC Pvt. Ltd.

IMPACT OF REARING OF MULBERRY SILKWORM (*BOMBYXMORI*L) ON THRIPS (*PSEUDODENDROTHRIPSMORI* NIWA) INFESTED MULBERRY LEAVES

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ABSTRACT

Mulberry (*Morus* spp.) is thechief food plant for the silkworm, *Bombyxmori* L. and the sericulture industry mostly relied up on the mulberry is attacked by a number of insect pests, and pathogens around the year and thus not only affect the leaf quality but also responsible for poor yield. Among the sucking pests, *Pseudodendrothripsmori*Niwa (Thysanoptera; Thripidae) is one of the most dominant species in different parts of the world on mulberry throughout the year. The effect of thrips infested leaves on rearing performance and cocoon production have been studied. During rearing, larvae were fed with good quality of mulberry leaf while another lot were fed with infested leaves. The result showed that they was a significant decrease in larval weight, ERR, total cocoon production, cocoon weight, pupal weight, shell weight, silk filament length and silk filament weight, due to feeding of thrips infested leaves. However, shell ratio, denior and renditta were not significant among them.

KEYWORDS: Mulberry Silkworm (*Bombyxmori* L.), *Pseudodendrothripsmori*Niwa (Thysanoptera; Thripidae), cocoon weight, pupal weight, shell weight, silk filament length and silk filament weight

INTRODUCTION

Mulberry (*Morus spp*) is a perennial, deep rooted, fast growing and high biomass producing plant. It forms the basic food material for the silkworm, *Bombyxmori* L. Mulberry is attacked by a number of insect pests, parasites, predators and pathogens around the year which not only affect the leaf quality but also responsible for poor yield. Mulberry is reported to be attacked by more than 300 species of insects belonging to various orders. Pests are of major significance for mulberry cultivation for foliage production. According to an estimate, the pests and diseases cause about 25% loss in foliage production of mulberry, besides deteriorating the nutritive value of leaves.

Increased production of raw silk, to large extent, depends on timely supply of quality mulberry leaves to silkworms. It is therefore clear that mulberry leaf plays a dominant role in cocoon production as a major source of nutrition to the silkworm.The perennial nature of mulberry combined with monoculture practices harbours several pests throughout the year (Rangaswami*et al*., 1976). The changing scenario in mulberry cultivation practices poses newer threats likemulberry thrips and mealy bug becoming regular and serious menace. Infestation of mulberry garden by different species of thrips was already reported by different scientists (Etebari*et al*., 2000; Mound, 1999; Wan and Zhang, 1997). However, the mulberry thrips, *Pseudodendrothripsmori*Niwa(Thysanoptera: Tripiidae) is one of the important sap feeder sucking insect pests of mulberry. The average estimated leaf loss due to this pest is about 40 – 50 per cent of the total leaf produced (Mahadeva, 2011).

*P. mori*feed on fully expanded leaves and young tissue in the bud (Lewis, 1997). Thrips causes a damage on a single leaf blade by using their mouth parts, rasp the epidermis on the ventral side. During laceration, they secret saliva, which coagulates the sap resulting in the formation of white streaks in the early stage followed by salivary blotches (Hadimani*et al*. 2006). In the present study effect of feeding of thrips infested leaves on silkworm rearing performance and cocoon production were studied.

MATERIALS AND METHODS

The silkworm larvae were divided into two lots and each having 50 larvae with 5 replications and reared in the laboratory under 32±2ºC temperature with RH of 65±70 % and photoperiod of 16L: 8D. The thrips free healthy and thrips infested leaves were fed to silkworm larvae separately to third instar. Data on larval and cocoon parameters such as larval weight, ERR, total cocoon production, cocoon weight, pupal weight, shell weight, silk filament length and silk filament weight,shell ratio, denior and renditta were recorded.

Data were subjected to statistical analysis of variance test for significant differences in the measure parameters of the control (healthy leaves) and thrips infested treatment. Paired‘t’ test, (Gomez and Gomez, 1984) was adopted to find the significance between the treatments.

RESULTS AND DISCUSSIONS

Thrips infested leaves when fed to silkworms, adversely affected all economic parameters (larval period, larval weight, ERR, cocoon weight, shell weight, shell ratio, filament length and weight) as compared to those reared on healthy mulberry leaves.

Larval Parameters

Table 1

Parameters	Mean wt. of Five Larvae (g)		‘t’ Value
	Healthy	Infested	
III instar	0.36	0.24	5.4890**
IV instar	0.64	0.53	7.9802**
V instar (1st day after moult)	4.01	3.16	4.3789*
V instar (5th day after moult)	11.41	7.55	10.6353**
Effective rate of rearing (%)	96.40	61.20	6.7197**

*Significant difference level at 0.05%

** Significant difference level at 0.05% and 0.01%

The results showed that the thrips infestation has negative effect on larval growth and cocoon parameters. The significant difference in larval weight was showed from fourth instar onwards.The drastic reduction in larval weight (7.55 g) in thrips infested leaves than healthy (11.41 g) leaves on fifth instar at fifth day after moult. The mortality rate of larvae at 5th instar was also high with the feeding of thrips infested mulberry leaves. The effective rate of rearing was also reduced (78.80%) in thrips infested mulberry leaves even after twice the number of feeding than the healthy leaves due to less moisture retention capacity in the storage. This may be due to the reduction in moisture content, moisture retention capacity and nutrients in the mulberry leaves. Etebari and Bizhannia (2006) were also observed the similar effect on silkworm growth and development by thrips infested mulberry leaves in different varieties.

Cocoon Parameters

The number of cocoon, cocoon weight, shell weight, pupal weight, shell ratio, silk filament weight, silk filament length, denior and renditta was decreased considerably in the lot fed with thrips infested leaves. Cocoon weight, shell weight, pupal weight, silk filament weight and silk filament length were also showed significance difference among the healthy and thrips infested leaves which were fed to silkworm. However, shell ratio, denior and renditta were not significant among them. So, it is clear that the reduction in quality of mulberry leaves due to thrips infestation in mulberry leaves had negative effects on cocoon production. Pail and Lee (1984) were reported that mulberry thrips caused 12% reduction in cocoon weight. Etebari and Bizhannia (2006) were also reported that the cocoon weight decreased more than 31 % in the larvae fed with thrips infested mulberry leaves. The cocoon characteristics of silkworm fed on healthy and thrips infected mulberry leaves showed in the Table 2.

Table 2

Parameters	Mean value of Five Cocoon		't' Value
	Healthy	Infested	
Cocoon weight (g)	6.68	3.90	8.8039**
Shell weight (g)	1.62	0.81	18.6420**
Shell ratio (%)	24.28	21.10	1.8745
Pupal weight (g)	5.01	3.89	24.6604**
Silkfilament length (m)	1204.11	992.82	5.2776**
Silkfilament weight	0.22	0.17	3.7847*
Denior (d)	1.61	1.50	0.7631
Renditta	5.89	6.95	-2.3629

*Significant difference level at 0.05%

** Significant difference level at 0.05% and 0.01%

CONCLUSIONS

The pest infested leaves when fed to silkworms will exert an adverse impact on their growth and development, leading to cocoon crop failures (Pradeep Kumar *et al.*, 1992; Doureswamy and Chandramohan, 1999; Shree and Mahadeva, 2005; Muthuswami*et al.,* 2010). The pest injured mulberry leaves should not be used for silkworm feeding as they are known to affect the commercial characters of cocoons (Mahadeva and Shree, 2004).

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